

CYCLONIC DISTURBANCES IN SOUTHERN OCEANS

By ALBERT J. McCURDY, Jr.

South Atlantic Ocean.—Weather reports thus far received from vessels that traversed the shipping routes of the South Atlantic Ocean in October, 1924, indicate only one disturbance of any consequence.

From the 9th to 12th the American S. S. *Swiftwind*, Capt. A. W. Barlow, Texas City to Buenos Aires, experienced southwesterly gales accompanied by heavy head seas off the coast of Uruguay. Mr. A. C. Allen, second officer, states that the lowest barometer, 29.86 inches, was recorded at 8 p. m. on the 9th in 28° 32' S., 47° W. The wind at the time of the lowest pressure was SW., force 5. By the 12th the gale had increased to force 10 from the southwest but lasted only until noon.

This same gale was experienced by the American S. S. *Tuscaloosa City*, Capt. R. C. Forbes, New York to Montevideo. Mr. T. W. Marvin, second officer, reports that the lowest barometer noted was 29.85 inches, occurring at 2 a. m. on the 10th in 28° 14' S., 46° 27' W. The

wind at this time was SW., force 8, later increasing to force 11. With the *Tuscaloosa City* this gale lasted until 2 p. m. of the 12th.

South Pacific Ocean.—Of the cyclonic disturbances occurring in the South Pacific Ocean during October, only one of any significance has been reported. This was a depression off the east coast of New Zealand. The British S. S. *Mahana*, Capt. W. Kershaw, Balboa to Auckland, came within its influence on the 11th, experiencing a west-northwesterly gale accompanied by very heavy seas. Messrs. F. Smith, second officer, and F. Gilroy, fourth officer, report that the lowest pressure was 29.48 inches (uncorrected), occurring at 4 p. m. on the 11th in 34° 47' S., 168° 42' W. The wind at this time was WNW., force 8, but later shifted to WSW., and increased to force 9 on the 12th. To quote:

After blowing force 5 from 2 p. m. on the 12th to 2 p. m. on the 13th the wind increased to gale force, maintaining a steady WNW. direction with barometer only fluctuating very slightly.

At 10 p. m. the wind fell off a little and by 6 a. m. on the following morning was blowing W., force 5, barometer still steady.

551.506 (73) DETAILS OF THE WEATHER IN THE UNITED STATES

GENERAL CONDITIONS

By ALFRED J. HENRY

The outstanding feature of the month was the drought that prevailed east of the 100th meridian and to the south of the parallel of about 37° north latitude. In all of this region precipitation was greatly deficient, save only in the Florida Peninsula, where the tropical cyclone of the 17th–21st was the occasion of heavy rainfall. The rainfall, however, did not extend beyond the limits of the State. Associated with the drought, but whether in the relation of cause and effect is not known, was the tendency for anticyclones to persist over Atlantic Coast States, presumably as a result of the frequent renewal of their supply of polar air from higher latitudes. In that position these anticyclones seemed to form an obstacle to the normal eastward movement of cyclonic systems that approached from the west. The text and charts which follow present the usual details.

CYCLONES AND ANTICYCLONES

By W. P. DAY

The persistence of high-pressure areas over the eastern portion of the country was the outstanding feature of the month. Low-pressure areas formed frequently over the Rocky Mountain and Plateau regions, but made very little headway eastward, and in most cases were forced northward and the southern ends of their troughs were closed by high pressure. The failure of these troughs to traverse the country, closely connected with the prevalence of high pressure to the east, are interesting facts in connection with the drought which prevailed over the Middle and North Atlantic States.

The hurricane which developed during the 13th–18th over the northwestern Caribbean Sea passed over the extreme western end of Cuba on the 19th. It caused some of the lowest barometer readings ever recorded in these regions. A land station, Los Arroyos, reported 27.52 inches and two vessels reported under 28 inches.

FREE-AIR SUMMARY

By V. E. JAKL

The outstanding feature of the month was the frequency with which winds having a decided easterly

component occurred at various levels throughout the region covered by aerological stations. This marked easterly tendency of the upper winds was apparently associated with the prevalence of stagnant or slowly moving high-pressure areas, which, instead of the usual succession of high and low pressure areas, largely influenced this portion of the country. The unusual condition of general easterly winds prevailing for a period of days over a considerable portion of the country was observed twice during the month. From the 10th to 12th and from the 20th to 25th, particularly during the latter period, easterly winds to high altitudes were observed with great regularity at nearly all aerological stations. In addition, easterly winds were observed quite frequently on scattered dates and over scattered areas. In the resultants for the month, however, the easterly component is apparent only in the South. Elsewhere east of the Rocky Mountains the resultant winds—especially in the lower 3,000 meters—show a circulation completing the anticyclonic circuit; i. e., southerly over the Mississippi Valley, westerly over the Lake region, and northerly over the Atlantic States. This distribution of resultant winds naturally resulted from the average high pressure for the month over the eastern half of the country.

The effect of the resultant winds on the mean upper-air temperatures is apparent from the figures in Table 1. Broken Arrow, Drexel, and Ellendale, which had winds decidedly more southerly than normal at all altitudes, showed temperatures well above the normal throughout the vertical column. At Royal Center, with normal winds from a general westerly direction, the temperature was also above normal at all levels, due to drainage from the abnormally warm region to the west. At Groesbeck, the most southerly kite station, where the winds were of normal direction and strength from about south, the temperature was very close to normal, while at Due West, another southern station, where winds had a decided northerly component, the temperature was perceptibly below normal for all altitudes observed.

Records of humidity showed no important features, except at Broken Arrow, Drexel, and Ellendale, where with temperature above normal the relative humidity was the same as normal. Consequently, the vapor pressure at these stations was decidedly above normal. Notwithstanding this higher average vapor content of

the air, precipitation during the month, although abundant at Ellendale, was very light at Broken Arrow and Drexel. The explanation is to be found in the fact that Ellendale was more often under the disturbing influence of low-pressure areas than Broken Arrow or Drexel.

A number of instances of high velocities aloft were recorded during the month, both in connection with occasional low pressure areas, and, at very high altitudes, in connection with the weak to moderate highs that were the prevailing pressure condition. Only such instances are mentioned as were recorded in two-theodolite pilot-balloon observations, or otherwise substantiated, as by kite observation or by simultaneous observation at adjoining stations. In connection with high-pressure areas, in a series of five two-theodolite observations made at Broken Arrow on the 14th, light velocities, averaging about 3 m. p. s., prevailed up to nearly 7,000 meters, above which the velocity increased rapidly in the next few thousand meters. Velocities exceeding 40 m. p. s., with a maximum of 50 m. p. s., were observed in every observation at altitudes above 10,000 meters. Throughout this series the wind was prevailing south-east up to 3,000 to 4,000 meters, above which it changed rather abruptly to a solid northwesterly current extending to the upper limits of the observations. On this date Broken Arrow was situated in the far southwestern portion of an extensive area of moderately high pressure. A two-theodolite observation made at Due West on the 2d, also in the southwestern portion of a high-pressure area, showed a parallel condition, i. e., an east wind to 3,000 meters, changing abruptly to a solid northwesterly wind that extended to 11,500 meters, with light velocity to 6,000 meters, but increasing steadily thereafter to 31 m. p. s. at the highest point of the observation.

In connection with low-pressure areas, single-theodolite observations made nearly simultaneously at Drexel and Ellendale on the 31st, showed at the former station a steady rise in velocity from 5 m. p. s. on the ground to 52 m. p. s. at 6,600 meters, and at the latter station, a steady rise from 7 m. p. s. on the ground to 62 m. p. s. at 7,300 meters. These observations were made a considerable distance to the southwest of the center of a well-defined low, the winds observed at both stations having been from westerly near the ground to northwest in the upper altitudes.

Further examples of the rapid increase in velocity with altitude characteristic of the regions apparently just outside of the influence of deep low-pressure areas to the north are given in the kite flights at Drexel on the 5th and 12th. In the former observation, a wind of 6 m. p. s. on the ground increased to 39 m. p. s. at 4,300 meters, and in the latter a velocity of 4 m. p. s. on the ground became 34 m. p. s. at 3,100 meters.

A two-theodolite observation made at Ellendale on the 14th showed a very abrupt rise in velocity from 2 m. p. s. on the ground to 18 m. p. s. at 500 meters above the ground in a south wind. Although this observation was made directly to the east of a weak low that apparently was developing strength, the abrupt rise in velocity appeared to belong to a type of wind increase with altitude common to the Plains States in connection with nocturnal temperature inversions, particularly in south winds, and as yet not satisfactorily explained.

The instances cited show some of the peculiarities of change of velocity with altitude, a knowledge of which beforehand would be of great value to aircraft. Some unusual arrangement of wind direction with altitude is also occasionally observed. An example of reversal of

the usual change in direction with altitude is shown in the two-theodolite observation made at Ellendale on the 25th. Ordinarily a wind of any direction near the ground becomes westerly at some altitude aloft. Ordinarily, also, easterly winds at high altitudes are light. On this date a wind of moderate strength from the southwest, changed abruptly to a strong wind from nearly due east at about 4,000 meters, the easterly wind prevailing from that altitude up to nearly 13,000 meters. On the following day approximately the same wind structure was observed at Lansing and Madison in single-theodolite observations extending to about 6,000 and 8,000 meters, respectively.

An illustration of marked convectional activity in a cumulo-nimbus cloud is given in the kite observation made at Broken Arrow on the 9th. During this observation the kite carrying the meteorograph broke from the line when about 2,700 meters high, and was carried upward about 400 meters by an ascending current. After reaching the top of the ascending current the kite fell to the ground. From the computed rate of ascent and descent it is evident that the current in which the kite was carried upward had a vertical velocity of at least 5.4 meters per second. This velocity is in agreement with the ascending velocity occasionally determined from observations made in pronounced convectional currents by the two-theodolite pilot-balloon method. From the following table, showing the meteorological conditions recorded during the flight, it will be noted that the lapse rate of temperature at the altitude in which the kite was carried upward exceeded the dry adiabatic.

Meteorological conditions over Broken Arrow, Okla., on October 9, 1924:

Altitude, M. S. L. (meters)	Temperature (° C.)	Δt 100 m	Relative humidity (per cent)
233 (surface).....	18.9	-----	79
673.....	20.0	-0.25	77
984.....	18.4	0.51	76
1,119.....	20.0	-1.19	71
1,316.....	17.1	1.47	85
2,312.....	11.3	0.58	57
2,330.....	11.0	1.67	85
2,504.....	11.7	-0.40	62
3,361.....	3.0	1.02	85
4,137.....	-2.4	0.70	78

TABLE 1.—Free-air temperatures, relative humidities, and vapor pressures during October

TEMPERATURE (° C.)												
Altitude m. s. l. (m.)	Broken Arrow, Okla. (233 m.)		Drexel, Nebr. (396 m.)		Due West, S. C. (217 m.)		Ellendale, N. Dak. (444 m.)		Groesbeck, Tex. (141 m.)		Royal Center, Ind. (225 m.)	
	Mean	De- parture from 7-yr. mean	Mean	De- parture from 9-yr. mean	Mean	De- parture from 4-yr. mean	Mean	De- parture from 7-yr. mean	Mean	De- parture from 7-yr. mean	Mean	De- parture from 7-yr. mean
Surface.....	17.7	+0.6	14.4	+2.6	14.6	-1.3	9.4	+1.4	17.4	-1.4	15.1	+1.0
250.....	17.7	+0.7			14.2	-1.4			18.4	-0.3	15.0	+1.0
500.....	17.8	+1.9	14.5	+3.0	12.2	-1.6	9.8	+1.6	18.5	+0.7	14.3	+1.6
750.....	16.9	+2.1	14.6	+3.9	11.0	-1.6	11.7	+3.5	17.2	+0.5	13.1	+1.7
1,000.....	15.9	+2.2	13.8	+3.9	10.0	-1.6	11.7	+4.1	15.7	+0.3	11.8	+1.7
1,250.....	14.6	+1.9	12.7	+3.5	9.4	-1.2	11.0	+4.2	14.4	+0.1	10.5	+1.6
1,500.....	13.3	+1.6	11.6	+3.3	8.7	-1.0	9.8	+3.9	13.4	+0.2	9.6	+1.9
2,000.....	10.7	+1.2	9.7	+3.7	7.3	-0.6	7.3	+3.6	11.9	+0.9	7.0	+1.6
2,500.....	8.3	+1.3	7.1	+3.8	5.9	-0.5	4.3	+3.1	9.6	+0.9	4.2	+1.2
3,000.....	5.5	+1.3	4.4	+3.8	3.7	-0.5	1.2	+2.7	7.3	+0.7	1.2	+0.6
3,500.....	2.4	+1.1	2.0	+4.1	0.7	-0.8	-1.5	+2.8	4.6	+0.2	-1.5	+0.4
4,000.....	-0.4	+1.1	-0.1	+4.5	-2.5	-1.2	-5.3	+1.7	2.0	0.0		
4,500.....	-1.2	+2.8	-2.7	+4.2	-5.4	-1.5			-1.5	-0.5		
5,000.....			-5.3	+5.1	-8.0	-1.5			-4.8	-0.8		

TABLE 1.—Free-air temperatures, relative humidities, and vapor pressures during October—Continued

Altitude m. s. l. (m.)	RELATIVE HUMIDITY (%)											
	Broken Arrow, Okla. (233 m.)		Drexel, Nebr. (396 m.)		Due West, S. C. (217 m.)		Ellendale, N. Dak. (444 m.)		Groesbeck, Tex. (141 m.)		Royal Center, Ind. (225 m.)	
	Mean	De- parture from 7-yr. mean	Mean	De- parture from 9-yr. mean	Mean	De- parture from 4-yr. mean	Mean	De- parture from 7-yr. mean	Mean	De- parture from 7-yr. mean	Mean	De- parture from 7-yr. mean
Surface	65	-1	61	0	58	-4	74	+7	71	-2	67	+1
250	64	-2	58	-4	58	-4	74	+7	63	-7	67	+1
500	55	-7	58	-1	57	-5	71	+6	54	-12	60	-3
750	52	-9	52	-5	54	-8	60	0	53	-13	60	-1
1,000	51	-9	50	-5	52	-9	56	-2	53	-12	59	-1
1,250	52	-6	49	-4	50	-9	54	-2	53	-10	57	-1
1,500	52	-4	50	-2	48	-9	52	-1	49	-12	52	-3
2,000	49	-1	49	-3	42	-10	50	0	38	-17	48	-2
2,500	44	-1	47	-4	33	-11	50	+2	35	-15	48	+2
3,000	41	0	44	-5	31	-11	52	+5	32	-11	52	+9
3,500	43	+3	38	-9	29	-11	54	+7	31	-9	42	+1
4,000	39	+3	36	-9	28	-10	56	+11	31	-6	42	+1
4,500	32	+2	35	-8	28	-9	56	+11	36	-3	42	+1
5,000	34	-8	34	-8	28	-9	56	+11	36	-3	42	+1

TABLE 1.—Free-air temperatures, relative humidities, and vapor pressures during October—Continued

Altitude m. s. l. (m.)	VAPOR PRESSURE (mb.)											
	Broken Arrow, Okla. (233 m.)		Drexel, Nebr. (396 m.)		Due West, S. C. (217 m.)		Ellendale, N. Dak. (444 m.)		Groesbeck, Tex. (141 m.)		Royal Center, Ind. (225 m.)	
	Mean	De- parture from 7-yr. mean	Mean	De- parture from 9-yr. mean	Mean	De- parture from 4-yr. mean	Mean	De- parture from 7-yr. mean	Mean	De- parture from 7-yr. mean	Mean	De- parture from 7-yr. mean
Surface	13.07	+0.12	10.19	+1.48	9.74	-1.61	8.70	+1.52	14.77	-1.49	11.52	+0.75
250	13.00	-0.15	9.53	-1.66	9.53	-1.66	8.70	+1.52	14.26	-1.36	11.39	+0.74
500	11.76	-0.18	8.94	+1.43	8.14	-1.92	8.60	+1.51	12.52	-1.58	9.92	-0.54
750	10.72	-0.15	8.94	+1.26	7.20	-2.07	8.14	+1.49	11.25	-1.83	9.10	-0.70
1,000	9.87	-1.08	8.21	+0.18	6.53	-2.02	7.51	+1.39	10.28	-1.66	8.39	-0.75
1,250	9.21	-0.41	7.59	+1.06	5.99	-1.71	6.83	+1.28	9.52	-1.26	7.38	-0.56
1,500	8.46	-0.56	7.13	+1.10	5.47	-1.38	6.08	+1.10	8.18	-1.44	6.36	-0.36
2,000	6.61	-0.63	6.12	-0.98	4.36	-1.08	4.96	+0.94	5.31	-2.01	4.92	+0.29
2,500	4.96	-0.41	5.00	+0.82	3.48	-0.63	4.03	+0.75	4.02	-1.71	4.24	+0.58
3,000	3.77	-0.30	3.90	+0.60	3.06	-0.39	3.40	+0.74	3.05	-1.25	3.81	+0.87
3,500	3.00	-0.27	2.99	+0.38	2.85	0.00	2.82	-0.65	2.92	-1.18	2.54	+0.20
4,000	2.12	-0.04	2.67	+0.45	2.63	+0.18	2.13	+0.45	1.34	-0.94	1.47	-0.77
4,500	1.47	-0.11	2.28	+0.51	2.49	+0.24	1.62	-0.84	1.47	-0.77	1.47	-0.77
5,000	1.99	+0.55	2.39	+0.29	2.39	+0.29	1.47	-0.77	1.47	-0.77	1.47	-0.77

TABLE 2.—Free-air resultant winds (m. p. s.) during October, 1924

Altitude, m. s. l. (meters)	Broken Arrow, Okla. (233 meters)				Drexel, Nebr. (396 meters)				Due West, S. C. (217 meters)				Ellendale, N. Dak. (444 meters)				Groesbeck, Tex. (141 meters)				Royal Center, Ind. (225 meters)			
	Mean		4-year mean		Mean		9-year mean		Mean		4-year mean		Mean		7-year mean		Mean		7-year mean		Mean		7-year mean	
	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.
Surface	S. 7° E.	5.1	S. 2° E.	2.5	S. 14° E.	2.9	S. 21° W.	1.6	N. 55° E.	5.5	N. 50° E.	2.8	S. 29° W.	1.7	N. 79° W.	1.6	S. 66° E.	1.8	S. 71° E.	0.9	S. 1° E.	2.2	S. 42° W.	2.2
250	S. 8° E.	5.2	S. 2° E.	2.7	S. 14° E.	2.9	S. 21° W.	1.6	N. 52° E.	5.6	N. 50° E.	3.2	S. 29° W.	1.7	N. 79° W.	1.6	S. 66° E.	1.8	S. 71° E.	0.9	S. 1° E.	2.2	S. 42° W.	2.2
500	S. 4° E.	7.2	S. 5° W.	3.8	S. 6° E.	3.1	S. 26° W.	2.1	N. 61° E.	8.5	N. 54° E.	4.4	S. 16° W.	2.5	W.	1.7	S. 25° E.	4.7	S. 27° E.	2.9	S. 27° W.	5.0	S. 51° W.	4.5
750	S. 2° W.	8.0	S. 10° W.	4.5	S. 7° W.	7.8	S. 36° W.	3.7	N. 64° E.	10.5	N. 61° E.	4.6	S. 18° W.	4.2	S. 85° W.	2.6	S. 18° E.	4.7	S. 17° E.	3.1	S. 52° W.	5.3	S. 61° W.	5.7
1,000	S. 7° W.	7.3	S. 18° W.	4.4	S. 12° W.	9.6	S. 46° W.	4.2	N. 57° E.	8.8	N. 61° E.	3.6	S. 27° W.	4.9	S. 86° W.	3.1	S. 14° E.	4.4	S. 8° E.	2.9	S. 70° W.	5.4	S. 68° W.	6.3
1,250	S. 19° W.	7.5	S. 31° W.	4.4	S. 22° W.	9.6	S. 54° W.	4.8	N. 59° E.	8.8	N. 68° E.	3.0	S. 32° W.	5.4	S. 87° W.	3.8	S. 17° E.	3.9	S. 2° W.	2.9	S. 74° W.	4.4	S. 72° W.	6.9
1,500	S. 21° W.	7.0	S. 39° W.	4.4	S. 26° W.	9.1	S. 62° W.	5.4	N. 59° E.	8.2	N. 68° E.	1.9	S. 39° W.	5.6	S. 87° W.	4.5	S. 27° E.	3.4	S. 15° W.	2.7	S. 79° W.	4.6	S. 76° W.	7.7
2,000	S. 24° W.	6.7	S. 46° W.	4.7	S. 40° W.	9.5	S. 72° W.	7.0	N. 61° E.	5.1	N. 20° E.	0.4	S. 51° W.	6.6	N. 89° W.	6.1	S. 22° E.	1.9	S. 41° W.	2.4	S. 84° W.	6.4	S. 80° W.	9.0
2,500	S. 33° W.	6.8	S. 59° W.	5.1	S. 48° W.	10.3	S. 76° W.	8.2	N. 43° E.	6.2	N. 69° W.	2.0	S. 47° W.	8.2	N. 85° W.	7.5	S. 2° W.	2.1	S. 52° W.	2.7	S. 89° W.	6.9	S. 85° W.	9.8
3,000	S. 37° W.	7.6	S. 63° W.	6.0	S. 61° W.	11.1	S. 81° W.	9.5	N. 42° E.	4.9	N. 88° W.	3.2	S. 49° W.	8.8	N. 86° W.	8.8	S. 17° W.	3.4	S. 57° W.	3.4	N. 83° W.	7.2	S. 87° W.	10.7
3,500	S. 54° W.	7.4	S. 70° W.	7.2	S. 50° W.	9.9	S. 87° W.	10.2	N. 26° E.	4.7	N. 81° W.	5.2	S. 49° W.	9.6	N. 87° W.	10.6	S. 31° W.	3.7	S. 46° W.	3.5	S. 89° W.	11.5	S. 84° W.	12.9
4,000	S. 46° W.	7.2	S. 62° W.	8.4	S. 69° W.	13.1	S. 86° W.	11.3	N. 20° E.	3.9	S. 87° W.	6.5	S. 51° W.	12.1	N. 89° W.	11.4	S. 52° W.	3.3	S. 49° W.	2.7	W.	18.0	S. 83° W.	12.2
4,500	S. 33° W.	3.4	S. 76° W.	9.0	S. 83° W.	15.8	N. 87° W.	12.2	N. 1° W.	1.9	N. 71° W.	5.7	S. 54° W.	14.8	S. 79° W.	13.3	S. 74° W.	8.9	S. 70° W.	2.2	W.	18.0	S. 83° W.	12.2
5,000	S. 45° E.	9.1	S. 71° W.	9.8	S. 72° W.	16.5	N. 85° W.	11.8	N. 47° W.	3.3	N. 34° W.	6.9	W.	14.8	S. 79° W.	13.3	S. 74° W.	8.9	S. 70° W.	2.2	W.	18.0	S. 83° W.	12.2

THE WEATHER ELEMENTS

By P. C. DAY, In Charge of Division

PRESSURE AND WINDS

The chief factor in the history of the weather for October, 1924, was the persistence of anticyclonic conditions that centered over the Ohio Valley and northeastern districts almost continuously during the month. This in large measure obstructed the eastward movements of cyclones that formed over the Southwest or entered the United States from the North Pacific, forcing them, after reaching the Great Plains, to pursue northerly courses, mostly to westward of Lake Superior, instead of their usual easterly or southeasterly courses into the Mississippi Valley and thence toward New England. As a result, no cyclone of importance crossed the central valleys and eastern districts, and the month as a whole over these districts was remarkably free from storms of any character. Moderate temperatures were the rule, sunshine was constant for long periods, little or no rain occurred, opportunity was afforded for late crops to mature, and all outdoor operations went forward without material interruption.

Among the cyclones that advanced from the far West and threatened the interior districts the most important were as follows:

On the 3d low pressure advanced from the British Northwest, and by the 4th it was central over western Kansas. High pressure to the eastward barred its further movement in that direction and it was forced northward, and by the morning of the 5th had advanced to the western end of Lake Superior. It was attended by rather general, but mostly light rains.

About the 8th a low-pressure area had advanced from the far Southwest to eastern Colorado, where it had attained considerable severity. High pressure moving southward over the Great Lakes again obstructed the eastward movement, and by the following morning the center had advanced to eastern North Dakota and precipitation had occurred over much of the central and northern Plains.

Promptly following the above, another disturbance pursued a similar course from the far Southwest and was central over western Colorado on the morning of the 11th, whence it also took a northerly and even northwesterly course over the Dakotas to the Canadian Provinces. This was attended by some heavy rains in northern Arizona on the 7th, by heavy snow in the mountains of Colorado on the 8th, and by general rains over the northern Rocky Mountains and the adjacent plains to the eastward.

The middle decade of the month, save as noted above, was remarkably free from stormy conditions in all parts